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## Pre-Conditions for the Introduction of Computer-based Accounting Systems in Less Developed Countries

*John S. Chandler*

*H. Peter Holzer*

College of Commerce and Business Administration  
Bureau of Economic and Business Research  
University of Illinois, Urbana-Champaign



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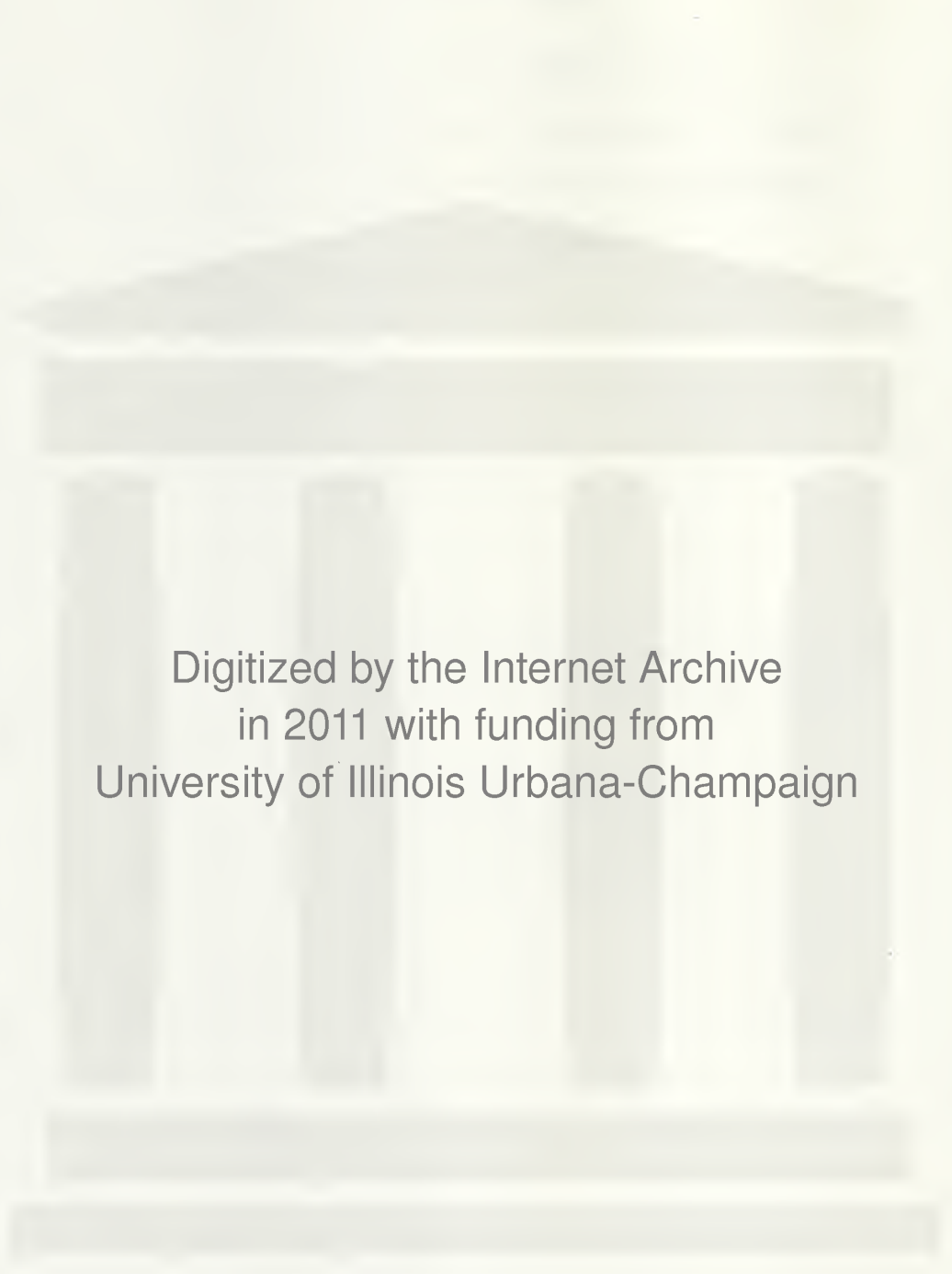
University of Illinois at Urbana-Champaign

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Accounting Systems in Less Developed Countries

John S. Chandler, Assistant Professor  
Department of Accountancy

H. Peter Holzer, Professor  
Department of Accountancy



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## Abstract

This paper presents a theoretical and practical framework for analyzing the potential for computerization in less developed countries(LDC's). The theoretical basis is derived from the Conceptual Framework for Accounting Information developed by the Financial Accounting Standards Board. The practical perspective examines computerization from a necessary resource approach. LDC's are analyzed and found to be critically deficient with respect to both criteria. This paper concludes with a discussion of how LDC's can attack these problems.



Pre-Conditions for the Introduction  
of Computer-based Accounting Systems  
in Less Developed Countries

I. Introduction.

The countries of the world can be grouped into three broad categories: developed, developing and less developed. Many characteristics can be used to distinguish the differences among these three groups (e.g., quality of life, degree of industrialization, literacy), but the most common discriminator is per capita income, with the boundaries at \$2000 and \$400. The problems are different in each category and so are the solutions. Some problems are merely differences in degree, such as the problem of literacy, but some are differences in kind, such as the problem of malnutrition. Another aspect that is a difference in kind is "readiness" for computerization of accounting systems and other EDP applications. This paper addresses the problems and needs of the less developed countries (LDC's) in preparing for computerization.

Computerization of developed countries, and their problems, have been well documented, both in the popular media and in the academic literature. The economic wealth of developed countries has allowed them to take the risks involved in extensive computerization. The fact that the vendors of hardware and software in the 50's and 60's were located in developed countries also had a great impact on the ease of

transforming a manual accounting environment into a computer-based one. The success of this movement in developed countries is obvious.

The problems of developing countries have been addressed by Perez(1980), Grassmugg(1976), Gibson(1975), Stamper(1976) and Ghosh et al.(1979). These sources suggest that the problems of computerization in developing countries are similar to those faced by developed countries in the 1950's and early 1960's. Thus, some of the solutions to these problems can be based, in part, on the solutions employed by the developed countries.

In LDC's, however, there are very few parallels to developing countries, let alone developed countries. This is particularly true in the field of computerization. Thus, different problems are surfacing and different solutions must be found. This paper will focus on the problems that are indigenous to many LDC's and will show how these problems erode the fundamental pre-conditions for computerization.

The majority of large accounting systems (AS) in LDC's are governmental accounting systems(GAS). The LDC's economies are primarily agrarian and there is little heavy industry or service industry. In many LDC's major industries are nationalized, thus adding to the scope of the GAS. Many of the industries that are not nationalized are owned by foreign multinationals which import their own accounting systems, manual and computer-based. In all countries the government is one of the important institutions that must maintain major record keeping and

reporting systems. Governments must, at a minimum, keep track of taxes and other revenues, expenditures, the balance of payments and the level of foreign and domestic debt. Thus, GAS's have a high potential for computerization in an LDC and they will be the focus of this analysis.

In order to establish a computer-based accounting system (CBAS) there are pre-conditions that must be satisfied before design and implementation can begin: conceptual and practical. From a conceptual perspective, the objective of the system should be to produce useful information. The definition and characteristics of useful information that will be used as a guide are those promulgated by the Financial Accounting Standards Board (FASB) in their Conceptual Framework (FASB, 1980). An integral part of any conceptual environment is a good system design, exemplified by the existence of a working manual accounting system. From a practical perspective, the necessary resources (personnel, technical and financial) must be available for successful construction and operation of a CBAS. This paper will detail how many LDC's are deficient in both the conceptual and practical areas, describe other idiosyncratic problems facing computerization in LDC's and offer some suggestions for the future of computer-based accounting systems in less developed countries.

## II. Preconditions

### A. Conceptual

#### 1. System Objectives

An information system, whether it is accounting or not, computer-based or not, is a system that collects, stores, classifies and communicates information to decision makers. To be effective an information system must produce information useful to these decision makers. The value of an information system therefore is closely linked to the information needs of decision makers. Such an evaluation, however, is highly variable because of the idiosyncratic nature of the decision making process and the personalities of decision makers. There are, however, "qualities inherent in information" (FASB, 1980) which are necessary for any decision making situation and decision maker. These qualities must be taken into account also in the design of an information system.

The FASB has described these attributes in their Conceptual Framework. Figure 1 depicts their suggested Hierarchy of Accounting Qualities. The attributes of cost-benefit, understandability and materiality are decision maker specific, being functions of the decision maker's capabilities and goals. The remaining attributes relate to the "decision usefulness" criteria. Table 1 lists the FASB's suggested definitions of these qualities. From an end-product perspective, these

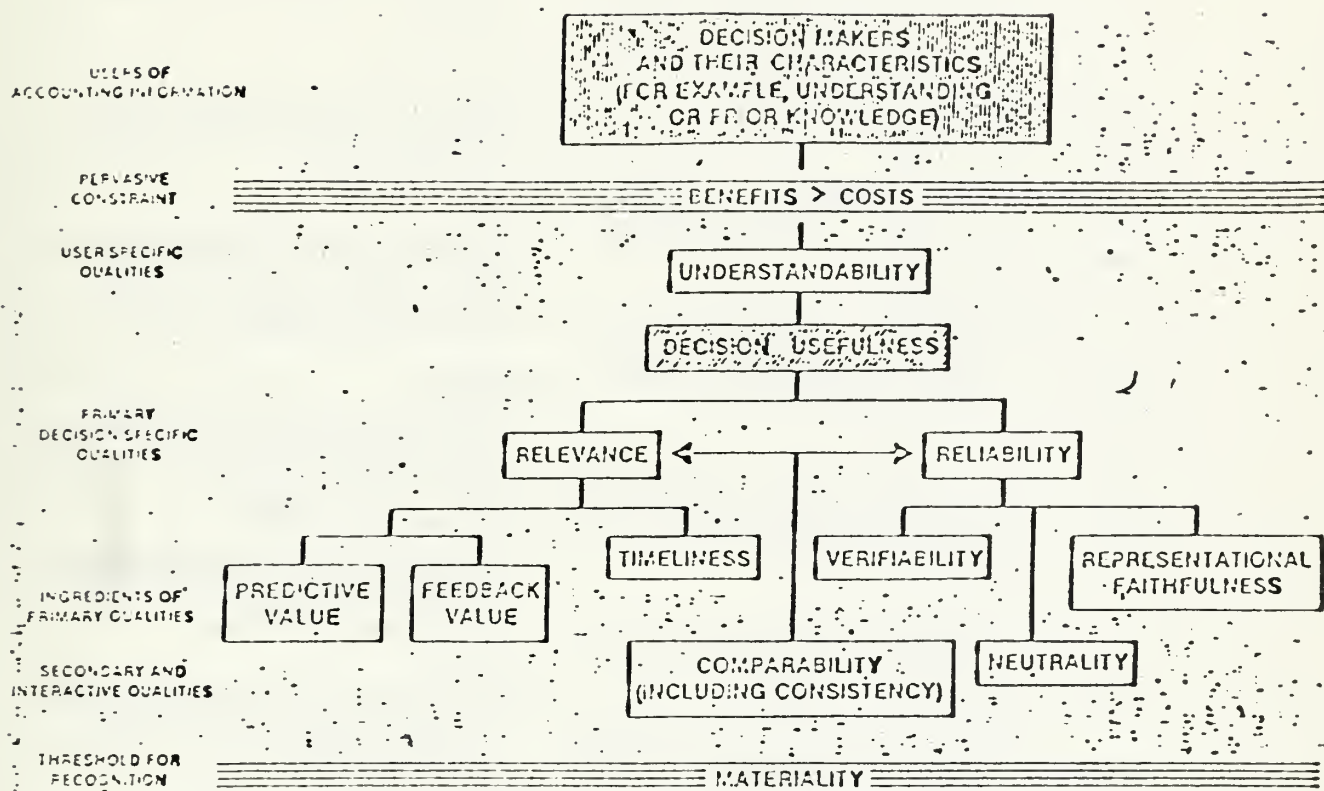


Figure 1. An Hierarchy of Accounting Qualities (FASB, 1980)

**Bias**

Bias in measurement is the tendency of a measure to fall more often on one side than the other of what it represents instead of being equally likely to fall on either side. Bias in accounting measures means a tendency to be consistently too high or too low.

**Comparability**

The quality of information that enables users to identify similarities in and differences between two sets of economic phenomena.

**Completeness**

The inclusion in reported information of everything material that is necessary for faithful representation of the relevant phenomena.

**Conservatism**

A prudent reaction to uncertainty to try to ensure that uncertainty and risks inherent in business situations are adequately considered.

**Consistency**

Conformity from period to period with unchanging policies and procedures.

**Feedback Value**

The quality of information that enables users to confirm or correct prior expectations.

**Materiality**

The magnitude of an omission or misstatement of accounting information that, in the light of surrounding circumstances, makes it probable that the judgment of a reasonable person relying on the information would have been changed or influenced by the omission or misstatement.

**Neutrality**

Absence in reported information of bias intended to attain a predetermined result or to induce a particular mode of behavior.

**Predictive Value**

The quality of information that helps users to increase the likelihood of correctly forecasting the outcome of past or present events.

**Relevance**

The capacity of information to make a difference in a decision by helping users to form predictions about the outcomes of past, present, and future events or to confirm or correct prior expectations.

**Reliability**

The quality of information that assures that information is reasonably free from error and bias and faithfully represents what it purports to represent.

**Representational Faithfulness**

Correspondence or agreement between a measure or description and the phenomenon that it purports to represent (sometimes called validity).

**Timeliness**

Having information available to a decision maker before it loses its capacity to influence decisions.

**Understandability**

The quality of information that enables users to perceive its significance.

**Verifiability**

The ability through consensus among measurers to ensure that information represents what it purports to represent or that the chosen method of measurement has been used without error or bias.

Table 1. Definitions of Accounting Information Terms (FASB, 1980)

inherent attributes represent the characteristics that must be provided by an information system to produce potentially useful information for the decision maker.

## 2. System Design

To be able to produce information with the above desired qualities, an accounting system must be well designed, operated and controlled. The design should make sure that the appropriate data are collected, stored and categorized. To be well designed, the AS needs an appropriate chart of accounts, good procedures and adequate documentation of those procedures. This gives the AS the opportunity to produce information with predictive value, feedback value and representational faithfulness.

An AS must also be well organized and operated. Data should be collected on time and in the correct forms, procedures must be followed and meaningful reports generated and distributed in a timely manner. This completes the cycle for predictive and feedback value by providing the relevant and accurate data to the decision maker. The efficiency of the operation naturally affects the timeliness of the delivery of information to decision makers.

Finally, an accounting system must be well controlled. This implies not only the presence of adequate internal control features, but also internal and external audits. The integrity and authority of these

control mechanisms depends on the professionalism of the auditing field, exemplified by a professional organization and enforced, professional standards. These controls provide the basis for reliable information. Over time they also provide a continuing, stable environment that allows for comparability.

It is paramount that an AS be conceptually sound before computerization begins. In an efficiently operating manual system, all the conceptual aspects of an AS can be tested and refined. It allows the operating personnel and the decision makers to use the system, to become accustomed to the procedures and to customize it to their particular needs and eventually to take advantage of the greater potential of the CBAS.

An efficient manual system also provides an excellent training ground. Operating personnel who master the manual accounting system are usually well prepared for the training necessary for a CBAS. This is especially true in the area of input processing and documentation. The entry level of technical skills required for a manual system is also much lower than for a CBAS and, therefore, many new employees can enter the information system field through this route and then later move towards the more technical positions. This is particularly important in LDC's where high, entry level skills are scarce. A manual accounting system also provides good training for accountants and auditors in the fundamental processes of an accounting system, without the added problems of technology.

A CBAS and a manual accounting system differ only in the mode of implementation. They should both preserve the same qualities of information. Thus, an absolute pre-condition for computerization is a successful, existing manual accounting system. This is not to say that all CBAS's are merely automated manual systems, but that an existing, successful, operating environment must exist before computerization. The lack of one can imply a lack of understanding of the accounting system's fundamental goals.

#### B. Practical Pre-conditions

For a computer-based accounting systems to be feasible, the necessary resources must be available. There are three major resources that support an CBAS: personnel, technical and financial. All three must be present to a sufficient degree for overall success. The absence of any one is catastrophic.

##### 1. Personnel Resources

There are four types of personnel needed to operate an effective CBAS. They follow the common Input-Process-Output paradigm of general systems theory (Figure 2). The Input or data collection phase requires many individuals with various abilities. They include, for example, source document handlers, data entry personnel and data librarians. These skills are not great but, especially for large-scale CBAS's, the number of people involved may be large.

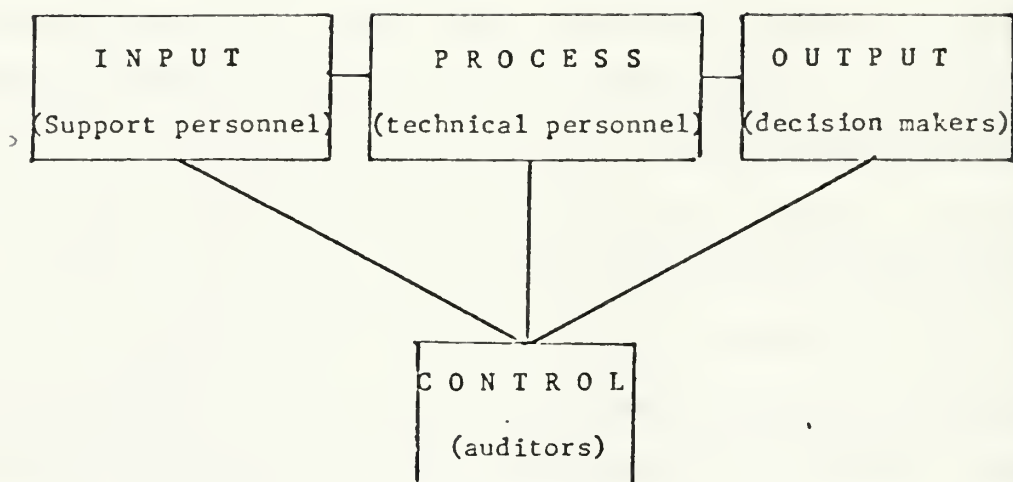


Figure 2. Personnel Resources

In the Process phase, computer programs are designed, built, tested and executed. The personnel required in this phase (programmer, analysts, testers and documentors) are highly skilled. Programmers should have advanced Computer Science training, a technical background or education and, in general, college degrees. Operators need Data Processing background. In any event, relatively high technical skills are necessary.

The Output phase refers to the use of the information output by management. A CBAS can serve its purpose only if the users of information outputs have the ability to apply this information. Their level of training in supervisory skills and management principles must correspond with that implied in the CBAS design. The CBAS would be a wasted resource if the users can not understand and use its output.

The fourth category of personnel involves the control of the CBAS. There should be an adequate number of auditors, both internal and external. From an internal perspective, they need to continually evaluate the design and operation of the AS; performing a quality control function and assuring that the built-in internal control features are operational. External auditors can give an objective evaluation not only of the external reporting function but also of the internal operations. Their background must include accounting, auditing, financial management and general business. Experience plays a significant role in their effectiveness.

## 2. Technical Resources

Availability of functionally needed technical resources is the most obvious practical pre-condition. There must be software to perform the necessary functions and hardware on which to run the software. Furthermore, the hardware requires a particular physical environment.

Hardware includes all the possible devices and configurations of computer-related machinery. A key point with respect to hardware is the currency of the technology. The hardware must not only function on the date of acquisition but also in the reasonable future. Acquiring inexpensive but obsolete versions of hardware may cause more harm than good in the long-run. Maintenance is, of course, a crucial aspect of hardware.

We do not include under software customized programs such as accounts receivable, inventory or financial management. These particular sets of applications will vary from country to country and government to government. There are programs, however, that provide a support background for many specific application. This software includes operating systems, utility programs such as sorts and file handling routines. A crucial aspect of this software is maintenance. There is a continuing need to maintain and update the support software. This can be done by the vendor, the users themselves or a third party.

Finally, the physical environment of the computer system is

important. The electric power supply must be stable. The hardware cannot withstand much variation in power without causing damage to the equipment itself or, at a minimum, loss of data. Machine rooms and data storage facilities must be environmentally controlled with respect to temperature and humidity. The sources of power for this system must also be stable. If the configurations involve more than a central site, then the stability of the communication system of the country is highly relevant. To summarize, the physical resources of a CBAS are powerful but delicate and need a controlled and stable environment to perform well.

### 3. Financial Resources

The final pre-condition is adequate financial support. A computer-based accounting system is a significant investment. Large-scale systems can be in the order of one to ten million dollars and for national level systems, they could easily be more than \$100 million. These costs are incurred in different forms over time. Figure 3 depicts the typical cost curve for the development of a CBAS. Table 2 specifies some common costs in these categories. Several aspects of this curve should be mentioned. The highest and largest portion of the curve lies in Section II, project-related costs. This period of time represents the greatest burden on financing and coincides with the greatest burden on the personnel and technical resources. The costs incurred in section IV involve on-going costs with important implications for recurring cash flow.

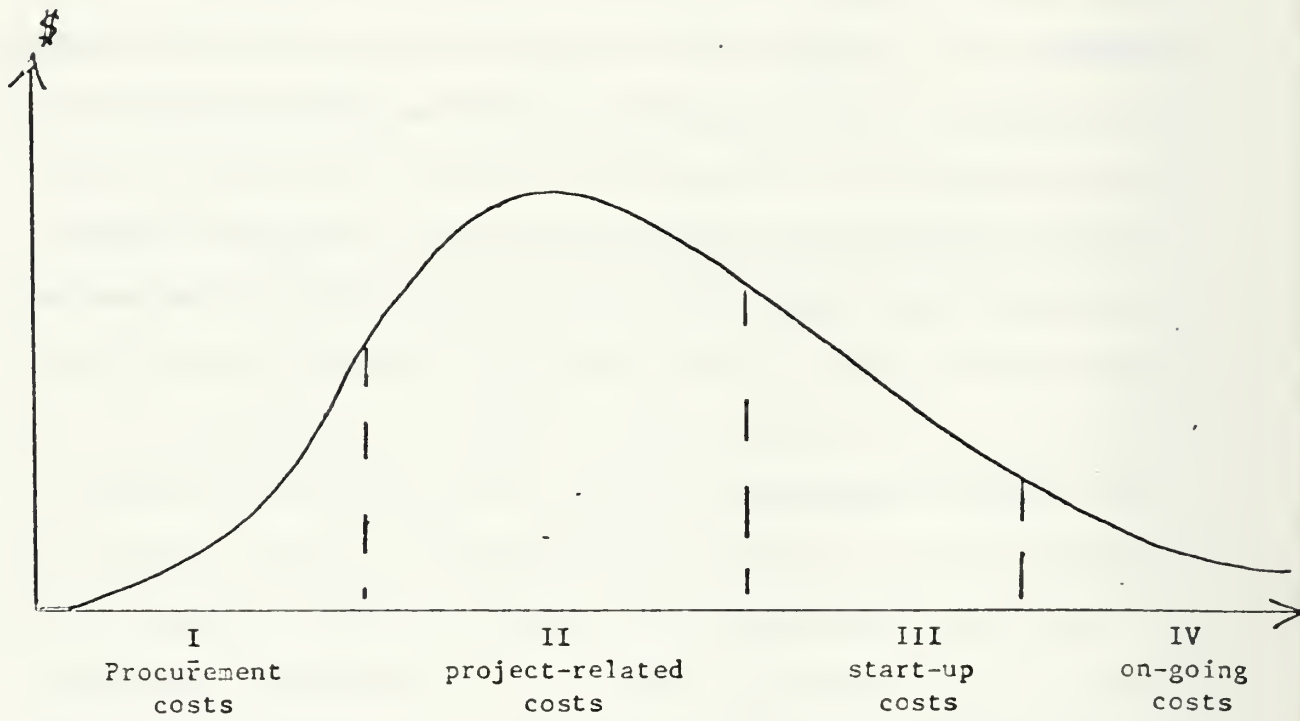


Figure 3. Cost Curve

*Procurement costs*

- Consulting costs
- Actual equipment purchase or lease costs
- Equipment installation costs
- Costs for modifying the equipment site (air conditioning, security, etc.)
- Cost of capital
- Cost of management and staff dealing with procurement

*Start-up costs*

- Cost of operating system software
- Cost of communications equipment installation (telephone lines, data lines, etc.)
- Cost of start-up personnel
- Cost of personnel searches and hiring activities
- Cost of disruption to the rest of the organization
- Cost of management required to direct start-up activity

*Project-related costs*

- Cost of applications software purchased
- Cost of software modifications to fit local systems
- Cost of personnel, overhead, etc., from in-house application development
- Cost for interacting with users during development
- Cost for training user personnel in application use
- Cost of data collection and installing data collection procedures
- Cost of preparing documentation
- Cost of development management

*Ongoing costs*

- System maintenance costs (hardware, software, and facilities)
- Rental costs (electricity, telephones, etc.)
- Depreciation costs on hardware
- Cost of staff involved in information systems management, operation, and planning activities

Table 2. Information Systems Costs (King & Schrems, 1978)

### III. Problems in LDC's

#### A. Conceptual Problems

A most serious conceptual problem in some LDC's is the lack of an operational manual accounting system. (The reasons for this will be detailed in Section IV.) We qualify this problem by the use of "operational" because some LDC's have an AS with a reasonable design. These were often from the previous colonial administrations: mainly French or British models. In many cases, LDC's have seen a good accounting system in operation, although it was often run, at least partly, by the European administrators and accountants.

Unfortunately the designs of these adopted accounting systems do not necessarily fit the needs of LDC's. The AS for a colonist-colony relationship is much different than the AS for an independent nation. Many were designed just to keep track of the operations of the colonies because decision making, financing and control were centralized in the parent country. Thus, the accounts and procedures were not oriented towards self-rule. Many of these accounting systems are have nevern been changed. They are still the basic cash-based systems left behind by a colonial power 30 to 40 years ago. Thus, they have not been updated or expanded to accomodate new developments and needs.

One other conceptual problem LDC's have is the state of the local accounting profession. It either does not exist or is inadequate in

terms of numbers or quality, or both. This implies a lack of modern accounting standards to be used as a guide in the design and operation of accounting systems. There are no audit standards, which makes an evaluation of auditing difficult. An inadequate professional body also reduces the opportunities for advanced training or certification.

## B. Practical Problems

### 1. Personnel Resources

As discussed earlier there are four categories of personnel involved in a successful CBAS. LDC's are woefully deficient in each of these areas. There are two fundamental causes of these shortages: lack of education and lack of funds (for appropriate salaries). For support personnel, the lack of general education is the key. Most LDC's have a literacy rate of 20%-40%. This is not catastrophic for the agrarian, service and unskilled labor sectors of the LDC economy, but, CBAS support personnel, by definition, must be literate. The simplest of CBAS support function, data entry, absolutely requires an ability to read and write. Other support functions require the ability to follow complex procedures (such as in machine room positions) or to document their performance (such as a tape librarian). In any case, the lack of education greatly reduces the number of potential support personnel available in LDC's.

The basic problem with the skilled positions (i.e., the technical,

audit and management positions) is the lack of funds to keep such personnel in the LDC. In all areas, once nationals are trained, either internally or externally, they become part of an international market. Western countries and rich, developing countries (e.g., the Mid East OPEC countries) siphon off a large number of the skilled personnel from LDC's (Chandler and Holzer, 1981a). In the Sudan, for example, it is estimated that over 750,000 Sudanese are currently working in the Gulf, out of a population of 20 million. This is even more significant when one considers that the estimated literate population of the Sudan is only 4 million. Many LDC's cannot afford to pay skilled workers enough to keep them in the country. The local economies of LDC's just cannot afford to pay these skilled workers what they are worth to keep them in the country.

Let us also briefly address each area of skill separately. The computer science technician in an LDC is further hampered by the lack of advanced training and professional opportunities. Few universities offer courses in computer-related areas and few businesses employ computer systems so that hands-on experience is limited. A similar situation exists in the area of accounting and auditing (Chandler and Holzer, 1981a; Rapley & Zimmerman, 1980; Due, 1982; Enthoven, 1983). Managers, obviously, exist in LDC's but they often lack experience and training in modern management practices. Furthermore, existing manual systems are often so poor that managers may have no idea as to the potential contributions of a good accounting system and good accounting information. Thus, they have little feel for what a CBAS can do for

them or how they can help in the design and operation of a CBAS.

## 2. Technical Resources

There are two main aspects of the technical resources that merit discussion: the availability of hardware and software, and the physical environment. The problems of the hardware and the software environments are similar and can be discussed jointly. Many hardware and software problems stem from the lack of technical personnel to build and maintain either.

There are also problems peculiar to the characteristics of hardware and software, themselves. Much of the hardware and software that is available are designed for developed or developing countries. Sophisticated distributed real-time systems, with hundreds of terminals, have little use in an LDC where making a phone call is difficult. Software for advanced financial analysis, strategic planning or transportation optimization find little applications in countries where an accurate census has never been taken. These tools are made to solve the problems of developed and developing countries, with their different assumptions, constraints and resources, not the problems of LDC's. One cannot simply downsize these applications to fit the needs of LDC's.

Unfortunately only this inappropriately designed technology is available to LDC's. Thus, LDC's must choose from inappropriate technology which is doomed to be ineffective before it is used. On the

one hand, one can understand the vendors' problem in that LDC's are not an attractive market: high risk and low profitability. Thus, there are few incentives for vendors to develop special product lines for LDC's. It is more cost-beneficial to sell the existing technology and try to customize it.

The limited market also affects the general availability of maintenance for hardware and software. There are very few vendors in LDC's to service the needs of computer clients. Those that are there often service mainly the needs of Western multi-nationals who have subsidiaries in an LDC; but this is an entirely different market. There are few vendors to choose from and there is hardly any competition. Thus, after the sale service tends to be poor. Spare parts are a chronic problem for all machines in LDC's, especially for high-technology equipment. Software maintenance is virtually non-existent.

The physical environment in LDC's usually poses severe problems. From a climatic point of view, many LDC's lie within 30 degrees latitude of the Equator. Thus, they are very hot and either very dry or very wet. These extremes can easily lead to severe conditions of drought, sandstorm and flooding. This results in a crucial need for temperature and humidity control for computer-based systems. The communication systems of most LDC's are very poor. Telecommunication service is irregular at best and non-existent at worst. The electrical power environment is woefully inadequate and unstable, either from lack of

capacity or disrepair. Daily power interruptions or failures are common in many LDC's.

### 3. Financial Resources

Funding is the final generic problem area for LDC's. They are categorized as LDC's because their annual per capita income is less than \$400. Thus, the government gets little from taxes. Most LDC's also have balance of payments problems. Large-scale projects, such as a nation-wide computing system, would require financial help from outside agencies such as the U.N., USAID and IMF. Although this gets the job done, and pumps money into the LDC, it may worsen their debt situation and dependency on other sources.

### IV. Impacts of Problems on Pre-conditions

The litany of problems identified above negatively affects all of the pre-conditions for computerization in an LDC. Table 3 depicts the situation on a problem by pre-condition basis. From a conceptual perspective, the lack of an operating manual AS impacts all of the conceptual preconditions. Current manual accounting systems in LDC's, in general, collect insufficient data, process it unsystematically or very slowly and do not store in an accessible form. For example, in the Sudan, although the central government has a sound, operating manual GAS, some of the regional systems have not been able to completely close their books for 8-10 years. Similar situations exist in other countries

Problems											
Pre-Conditions		Manual System	Professional Body	Support Pers.	Technical Pers.	Management	Auditors	Hardware	Software	Physical Environment	Financial Support
C	Relevant	x				x					
O	Predictive Value	x				x					
N	Feedback Value	x		x		x				x	
C	Timeliness	x				x					
E	Verify	x	x				x				
P	Reliability	x	x				x				
T	Faith. Repres.		x				x				
U	Neutrality		x				x				
A.	Comparability	x									
L	Well designed	x	x				x				
	Manual Sys. Well operated	x		x		x					
	Well controlled	x	x			x	x				
P	Support	x		x							x
R	Technical				x						x
A	Personnel										x
C	Resources					x					x
T	Management					x					x
I	Auditors		x								
C	Hardware							x			x
A	Software								x		x
L	Physical Envir.									x	
	Financial										x
	Resources										

Table 3. Problems and Pre-conditions

such as Pakistan (Qureshi, 1974) and Indonesia (Juchau, 1978). Thus, consumers of this "information" cannot get much feedback value or predictive value, not to mention, timeliness. Without a manual AS there is nothing with which to "faithfully represent" or compare, and there is little for auditors to verify. Auditing in LDC's, in general, relates more to recalculation than to attestation.

The other conceptual problem is the absence of adequate indigenous professional accounting bodies. This obviously affects the ability to control the manual system, and the design and operation of any CBAS. It is this body which provides the impetus to train accountants who can make the accounting choices is the AS design to produce information with predictive and feedback value. Without an adequate professional body, there is a severe shortage of qualified accountants to fill positions in an operating AS, further hampering a conceptual base (Chandler and Holzer, 1981a). This lack also affects the reliability of the AS because of the few trained auditors.

From a practical point of view, the problems in the three resource areas are catastrophic for the pre-conditions. In terms of personnel, the shortages in each of the four areas directly affects the practical needs of that area. But there are other effects. The lack of support personnel affects the efficiency of the accounting system which is manifested in the timeliness of the information produced and the smooth operation of the manual AS; both conceptual needs. The shortage of trained managers reduces the potential decision making value (predictive

and feedback) of the information produced. And again, the dearth of auditors not only affects the reliability of the AS but also its operational integrity.

In terms of the technical resources, the hardware and software problems and pre-condition map one-to-one. The physical environment, however, has a wider impact. A stable electrical system, air conditioning and humidity control are not obtainable on a consistent basis in an LDC. Even backup generators depend on often scarce supplies of fuel. The lack of good telecommunications systems eliminates design alternatives such as remote data entry, distributed systems and networking and affects the timeliness of the delivery of data. Thus, LDC's provide a rather "hostile" environment for a CBAS.

Finally, finances have the greatest effect is on the practical pre-conditions. Almost none of them can be realized without sufficient funds. There are, however, two different aspects of the funding problem. With respect to the technical resources, the need for funds is on a project by project basis. Thus, even with a limited amount of internal or external funds, some of these resources could be made available. The personnel funding problem is more serious. The lack of a salary structure that is appropriately mapped to the skills of the work force is systemic in LDC's. Promotions based on seniority or spoils is more common than promotions based on merit. Of course, by definition, LDC's just have less money to go around and large disparities in salaries could be socially disturbing. Thus, a solution

can only come through a rise in all salaries to a level where differential treatment can be tolerated by the society.

#### V. Suggestions for the Future

Before any specific suggestions are made, a general observation should be made. Although the solutions of the developed and developing countries do not apply to the problems of LDC's, one fundamental lesson should be learned from their efforts. All of the accounting and information system problems cannot be solved by computerization. If the conceptual design and operation of the manual accounting system are poor now, then they will still be poor in a CBAS that attempts to replace the old system, albeit it will be able to produce errors much faster. The CBAS is not a panacea, it must be placed in an appropriate conceptual and practical environment.

Analysis of Table 3 shows three key areas of concern: the state of the manual accounting system, the level of funds available and the supply of accounting personnel. All three are potentially controllable in the short-run. Some of the other problems, however, are uncontrollable (e.g., severe climate) or are long-run problems (e.g., illiteracy and the supply of support personnel). But with respect to these three areas several suggestions can be made.

A first priority is that the manual AS's in LDC's must be redesigned and upgraded. These systems must be redesigned to match the current

indigenous needs of the country. Bastardized colonial systems do not fit the needs and goals of LDC's. A national standard chart of accounts is essential. This not only facilitates integration of various levels of GAS in an LDC but it also reduces the training problem (Chandler and Holzer, 1981a).

Documentation of the manual system is currently non-existent or grossly out-of-date. A one-time effort, funded by donors, could provide great benefits. The efficiency of the manual accounting systems is linked to the support staff. Small increases in salaries and benefits could lead to a greater number of support personnel.

The shortage of auditors and accountants is rampant in LDC's. Training programs have been suggested from several sources (Chandler and Holzer, 1981a; Chandler and Holzer, 1981b; Rapley & Zimmerman, 1980). This is a second necessary step.

There are some long-term costs of computerizing before attaining the appropriate level of pre-conditions. A CBAS requires a high skill level of personnel to enter the field. By removing the manual system, the pipeline of future operating personnel is also removed. The low level training ground for both operating personnel and accounting personnel is also gone. Now, operating personnel must be ready to directly enter a technically much more demanding environment.

For nation-wide computerization, all the pre-conditions must be met.

This will take many years to accomplish. This does not mean, however, that no computerization at all should take place; only that massive computerization is not appropriate. Given the few numbers of management personnel available, as much as possible should be done to make them as effective and efficient as they can be. For example, microcomputers could be used in isolated instances to support specific decision makers. These devices are built to withstand more rigorous physical surroundings, require less technical support and are very inexpensive. But even in these situations much care must be taken to insure success.

One potential approach is to begin computerization slowly through a pilot project. Identify an accounting function that is narrow in scope, materially significant and currently operational. Use this function and the associated decision makers as an initial cell of computerization. Based on the success or failure of this initial project further computerization should be pursued.

There are several benefits from this approach. First, the users are given an opportunity to experience computerization without major investment or risk. This should take some of the pressure off of the user and let them concentrate on effectiveness. Second, there are less resources expended on a pilot project. This not only reduces the capital investment but also reduces the time and effort investment of technicians and users alike. Third, a smaller application, within a well-defined decision making situation, has a higher potential for success than large-scale applications. This success can serve to build

the confidence of the users in the capabilities of not only the CBAS but also in themselves to interface with the technology. Fourth, there is less long-term behavioral risks. A major systems failure could doom future applications by "poisoning" the users' attitudes against computerization.

At present, the international push for computerization arises more as result of "public relations" by vendors and developed countries. Progress and development are equated with computerization. It has been portrayed as a panacea for all administrative and financial problems. This is, of course, false. But, the LDC is the one that suffers from this fallacy: lost resources, dashed hopes and further delays in development.

The more appropriate reason for computerization is the true need of decision makers for support in their decision making functions. If they can see the benefit of computer-based support in their daily functions, then they may be favorably disposed to future endeavors. Such endeavors, e.g., large-scale computerization, can only be successful if upper management and the intended users fully support the new system. Because large-scale projects can have long development cycles, management support must be genuine and not dictated. Thus, the users and management need to be convinced of the benefits of computerization. Pilot projects are an appropriate approach to achieve this end.

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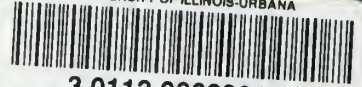
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